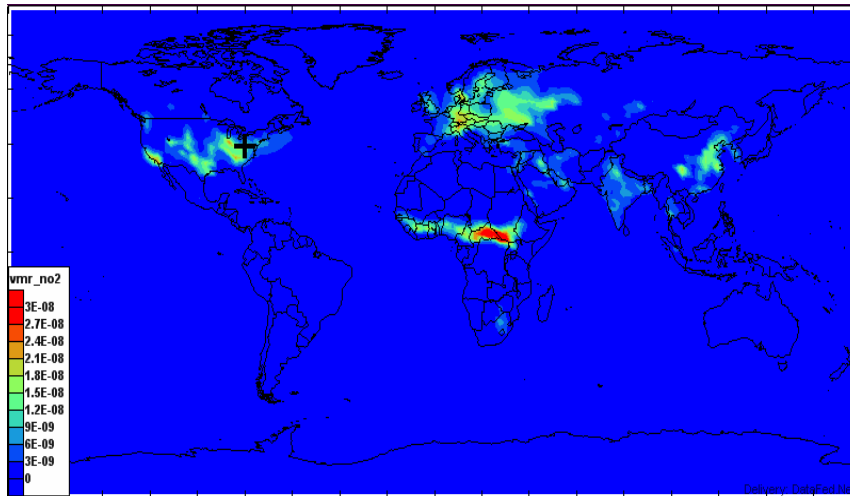


OMI NO₂ for AQ Management Applications

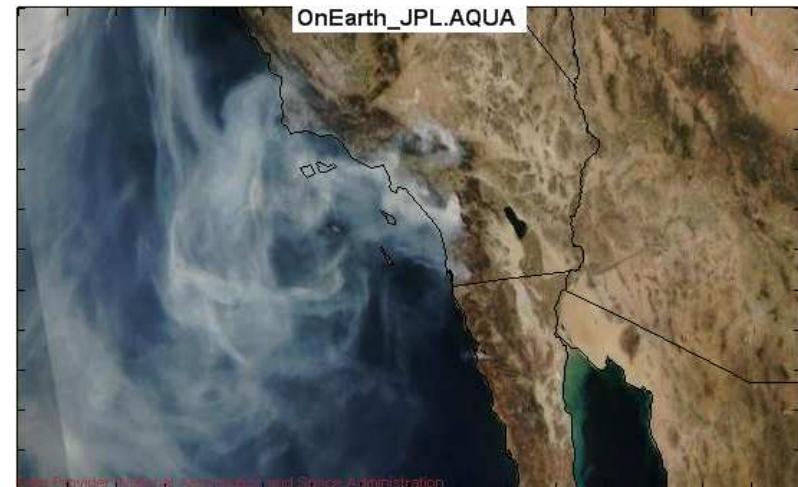
Policy Development:

Hemispherical Pollutant Transport



Regulatory Support:

Exceptional Event Quantification



Rudolf Husar, CAPITA, Washington University

NO₂ Workshop, EPA HQ, Oct 30, 2007

Hemispheric Transport of Air Pollutants (HTAP) Data Network:



Application Examples for NO_x Analysis

Collaborators:

Rudolf Husar, Washington U. St. Louis

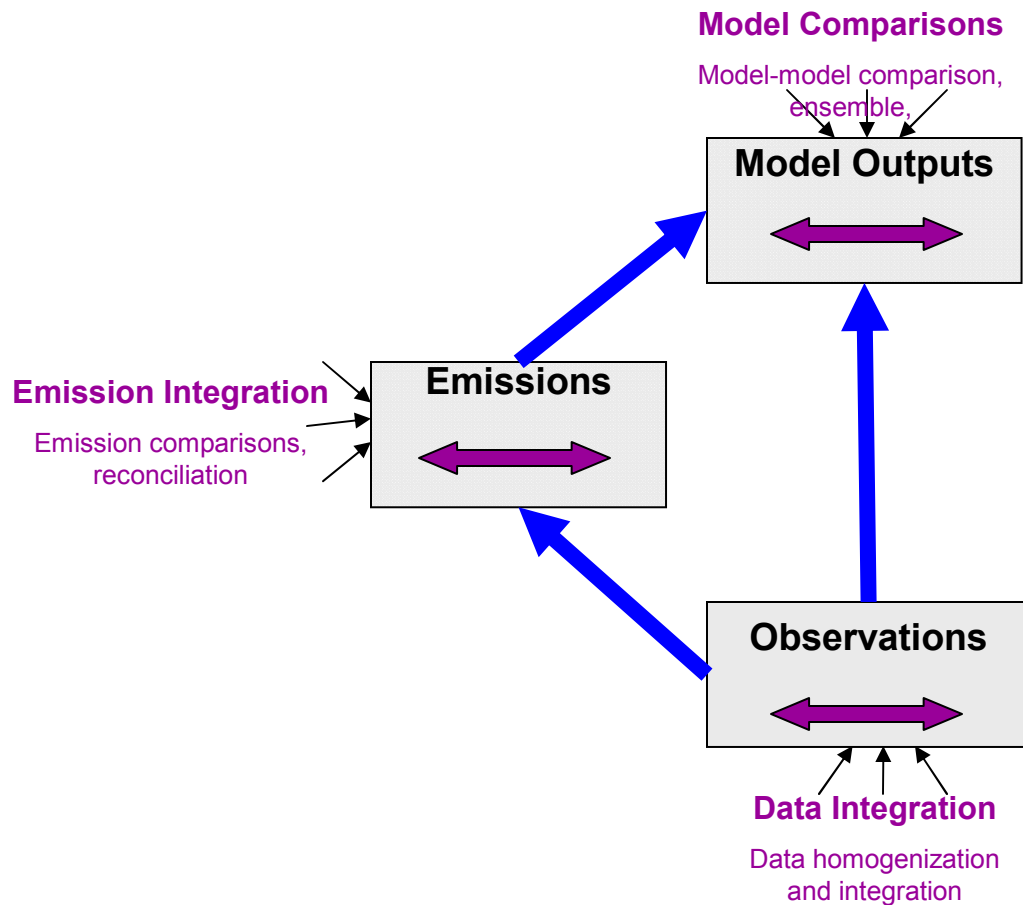
Stefan Falke, Northrop, Wash U.

Greg Leptoukh, NASA, Goddard

Martin Schultz, FZJ, Juelich

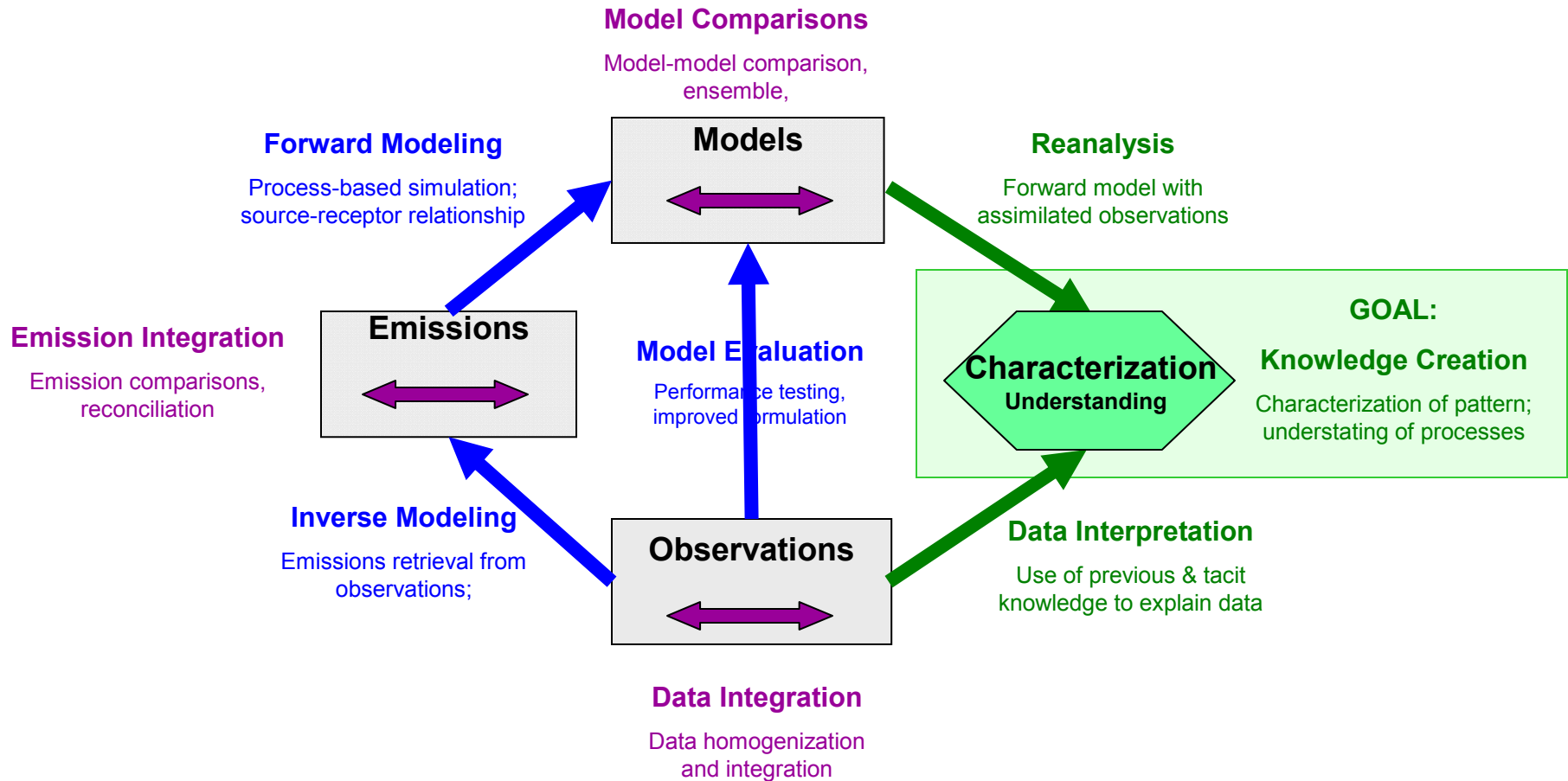
TF HTAP Workshop Forshungszentrum Juelich, Oct 17-19, 2007, Juelich, Germany

2009 HTAP Assessment



- Seek the reconciliation of models, observations, emissions

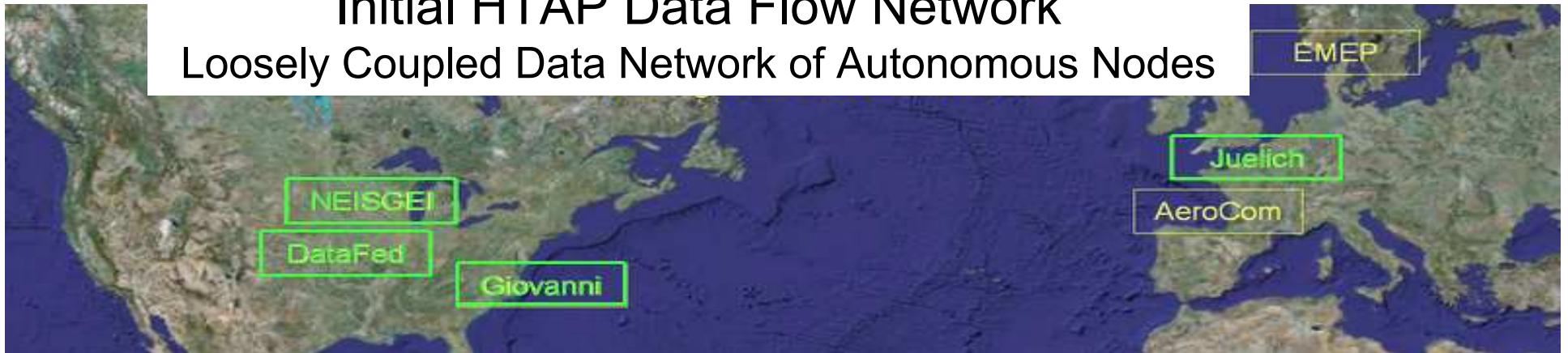
Iterative Air Pollution Analysis



- In the past, these activities were conducted separately; little mutual support
- Iterative linking would characterize the pollutants and create understanding

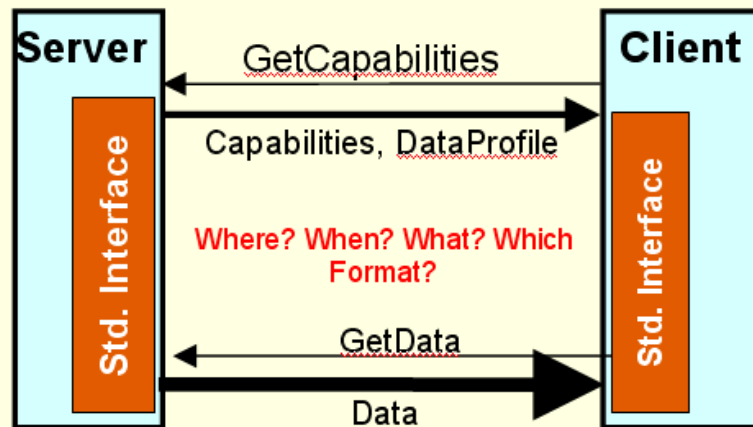
Initial HTAP Data Flow Network

Loosely Coupled Data Network of Autonomous Nodes


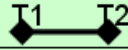


OGC WCS Data Access Protocol

Client-Server Communication Protocol



Standard Data Query Language

Query	<u>GetData</u>
Where?	BBOX 
When?	Time 
What?	Temperature
Format	netCDF, HDF..

Data Coding

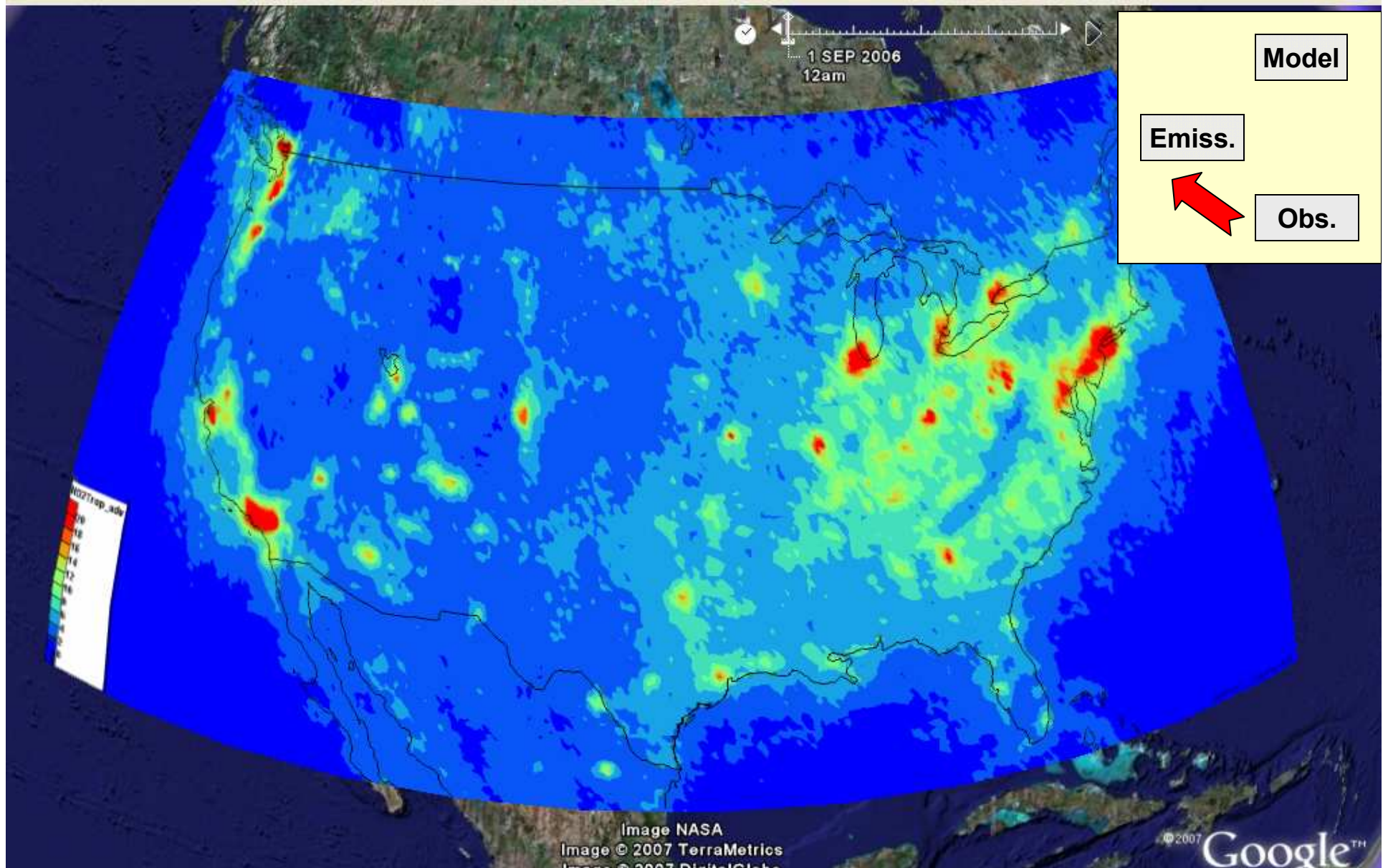
Geo-reference

Time-code

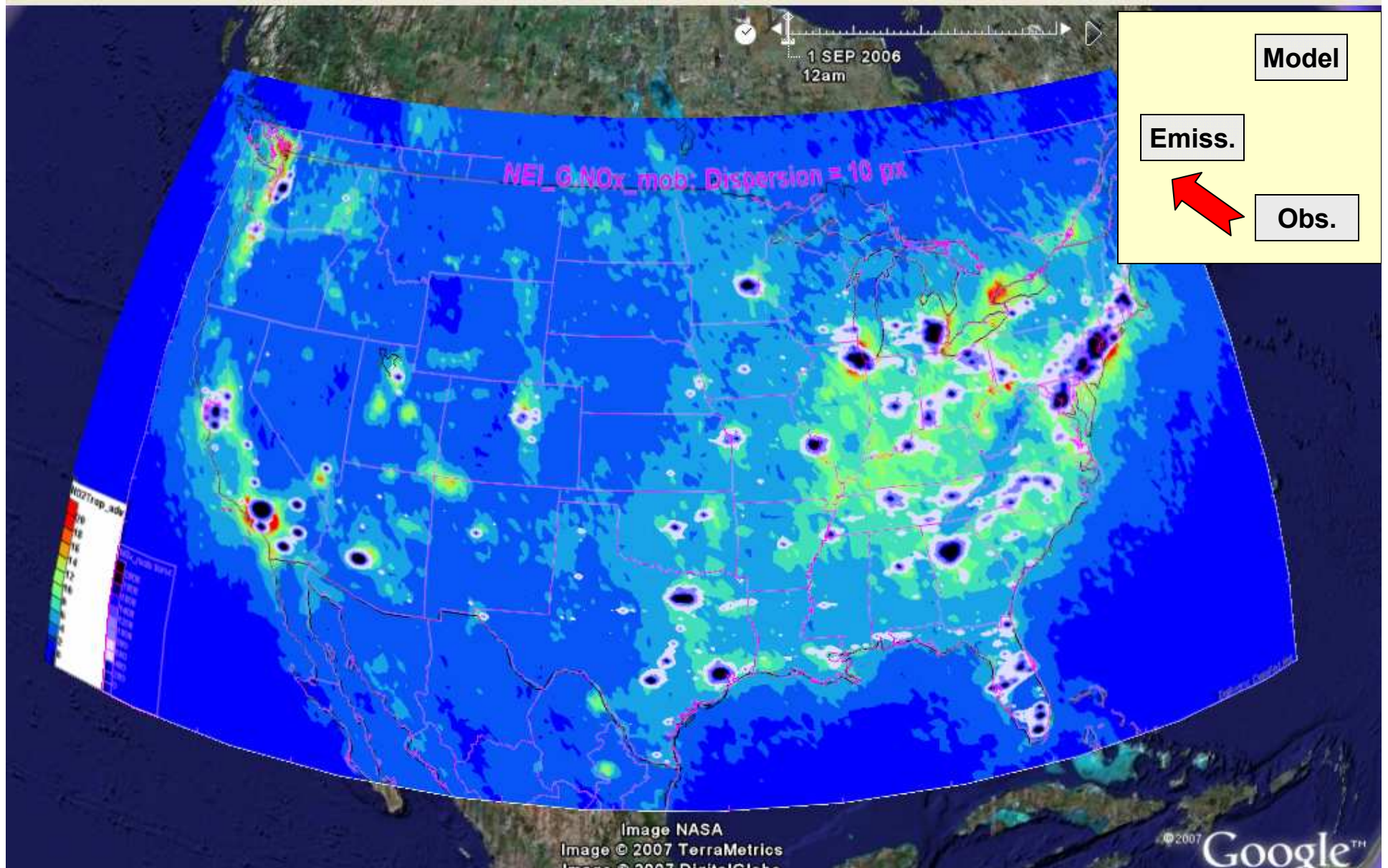
Standard names

Model, format

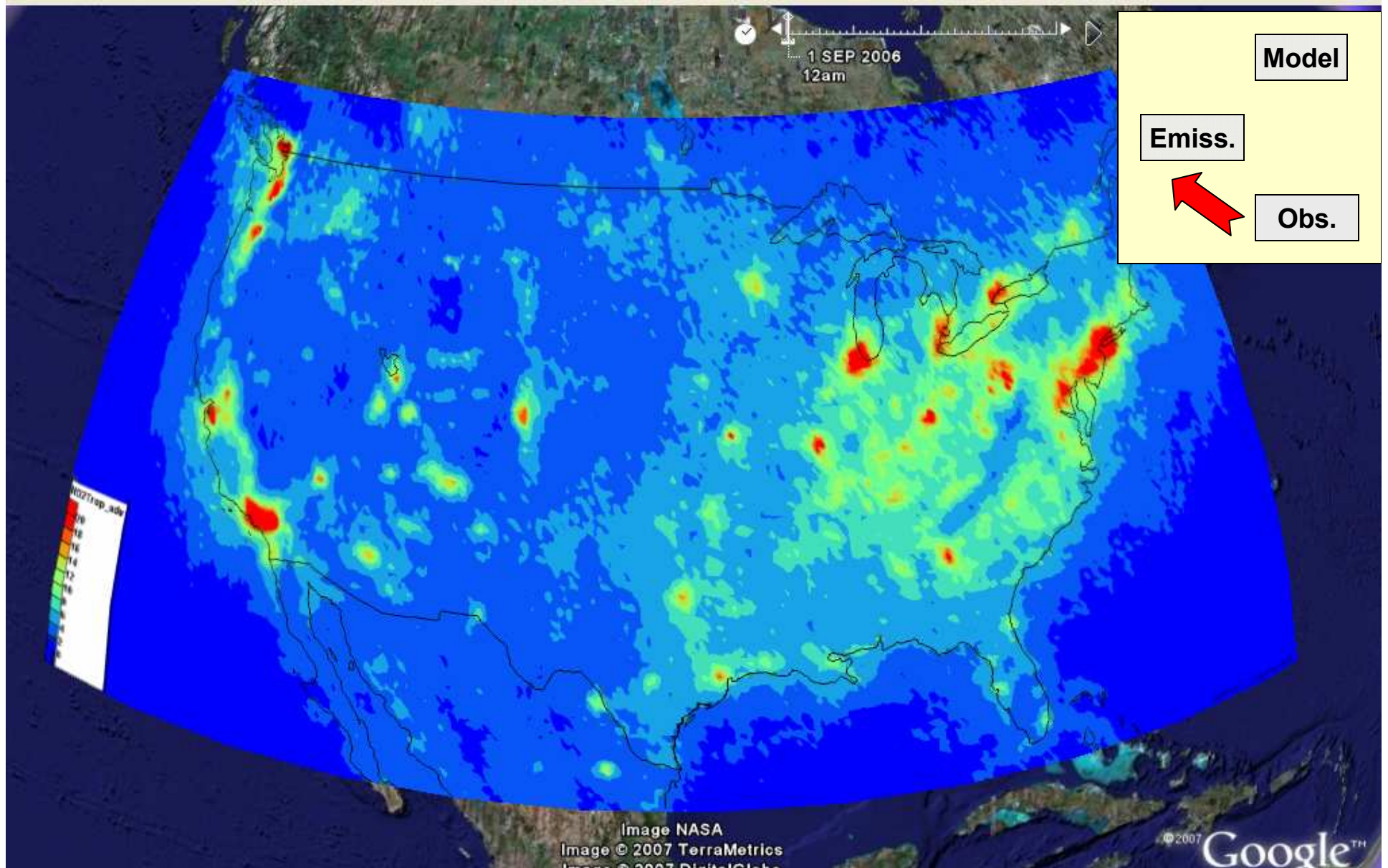
Tropospheric OMI NO2 Average



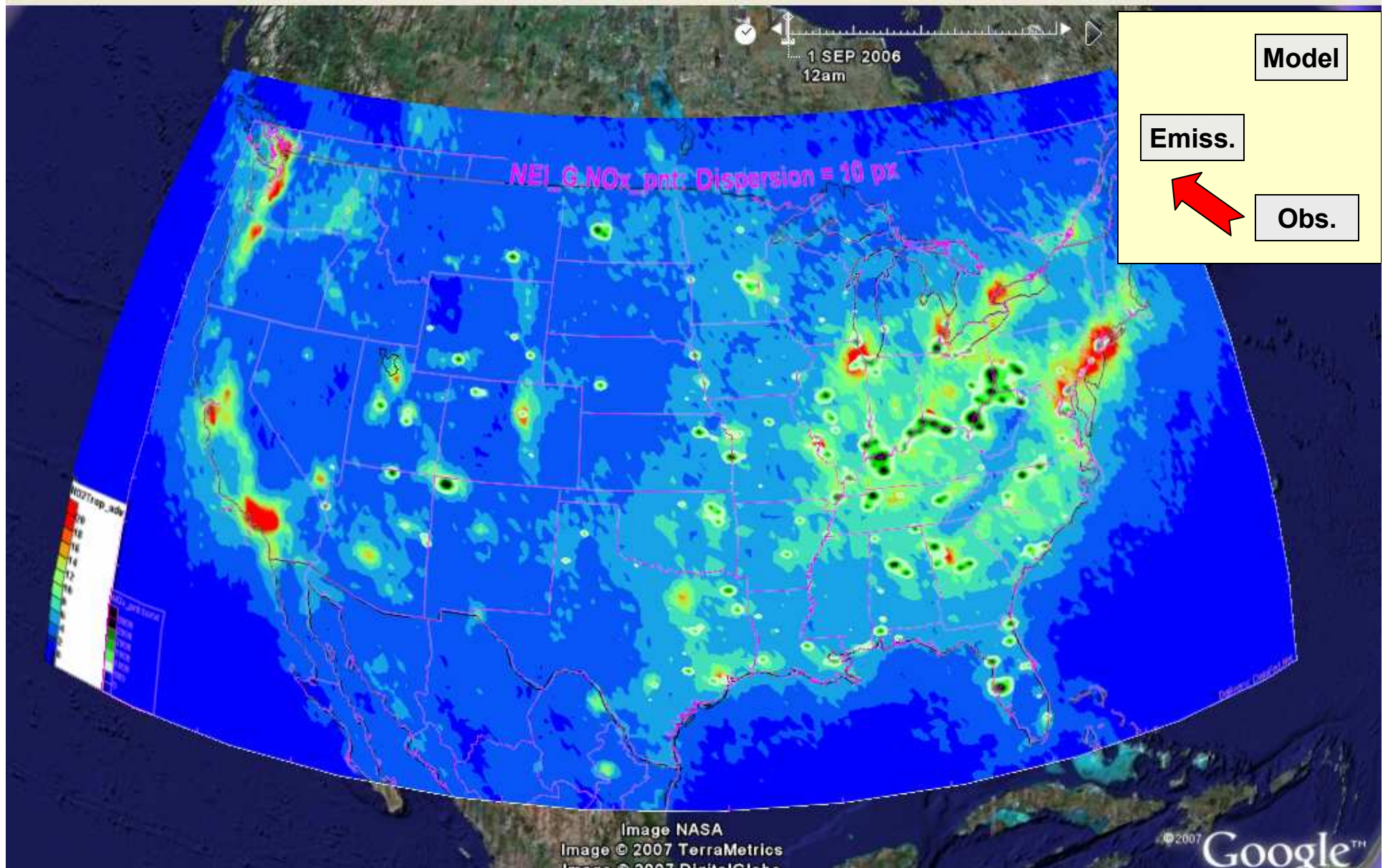
OMI NO2 – Mobil Emissions



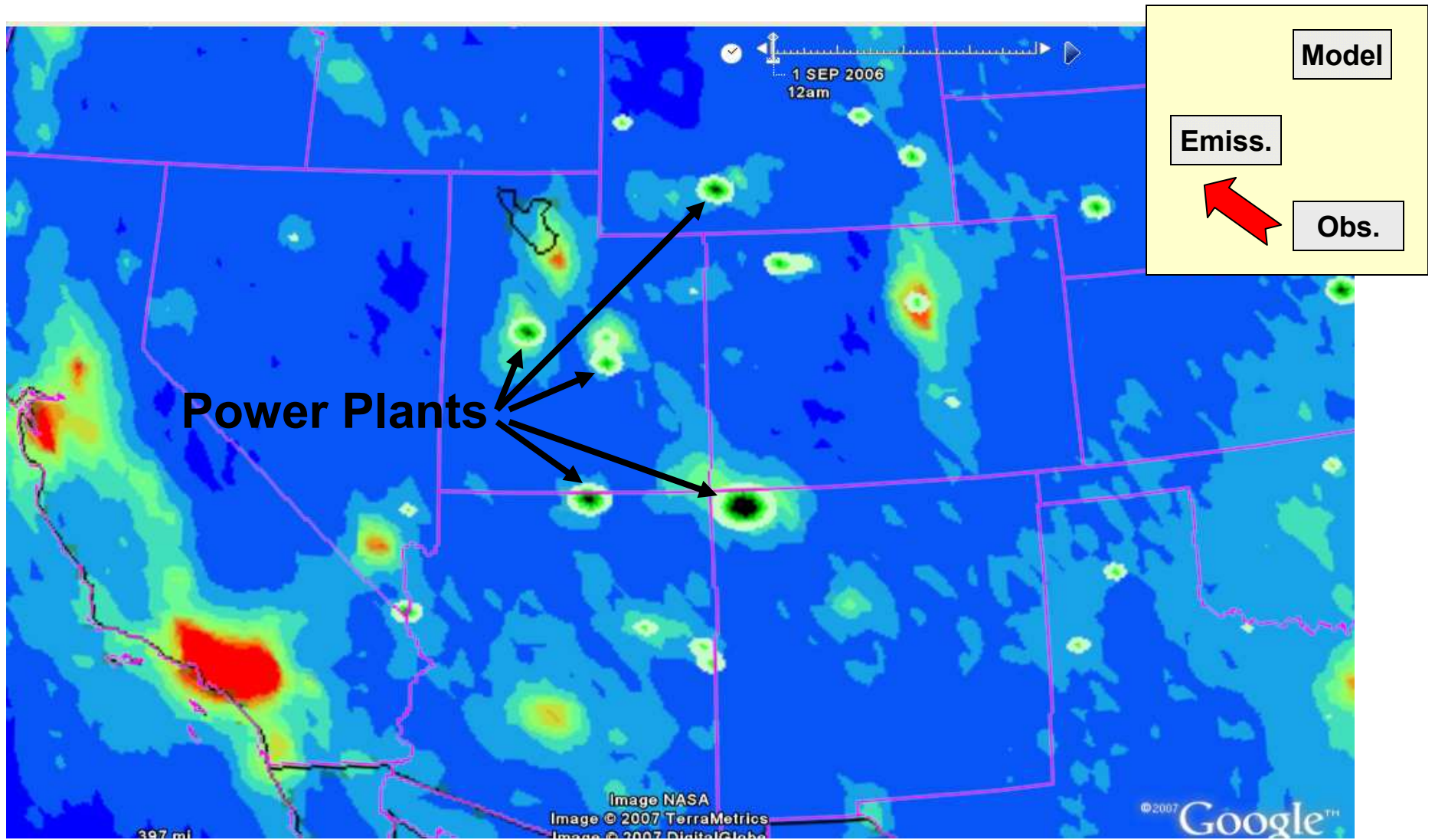
Tropospheric OMI NO2 Average



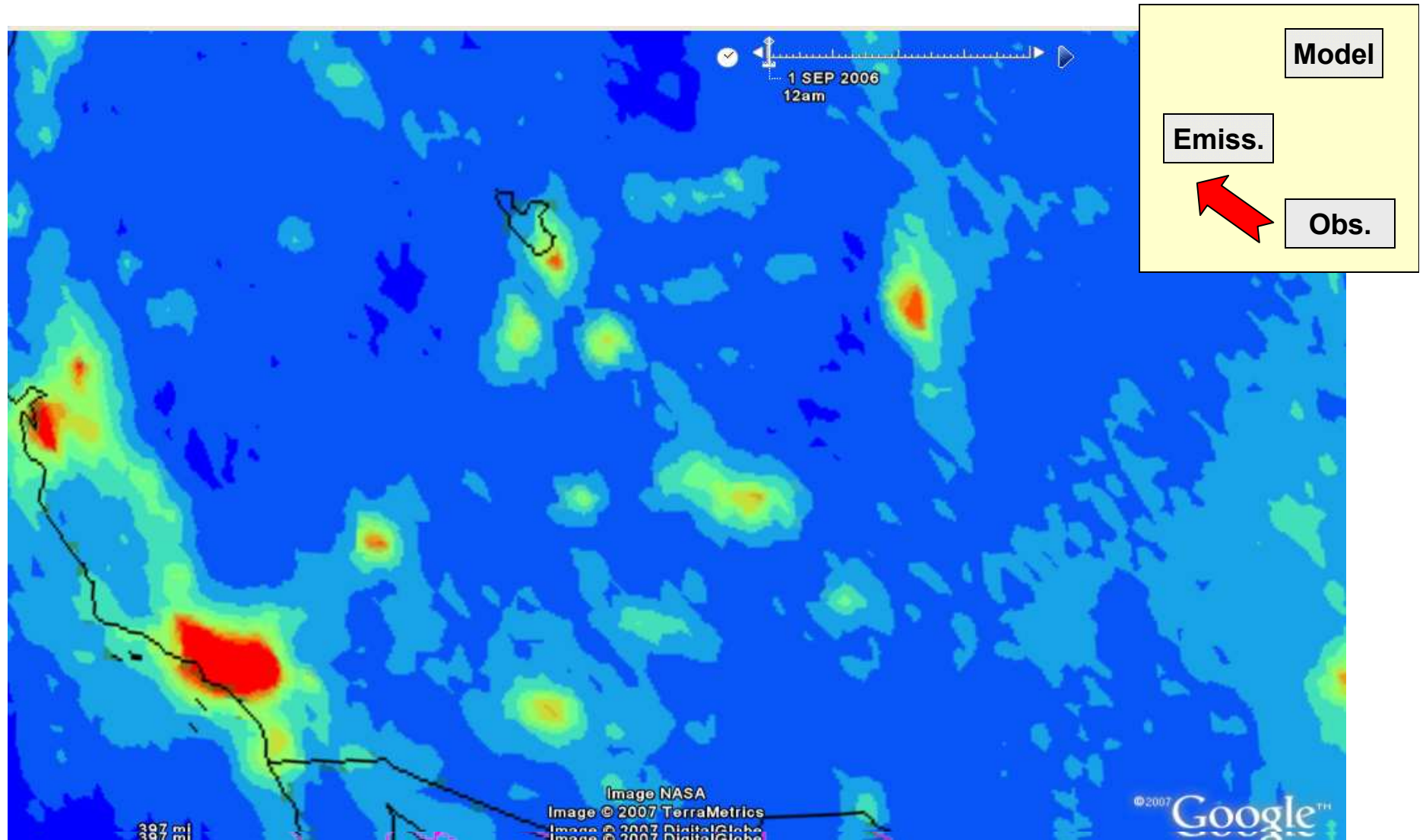
OMI NO2 – Point Emissions



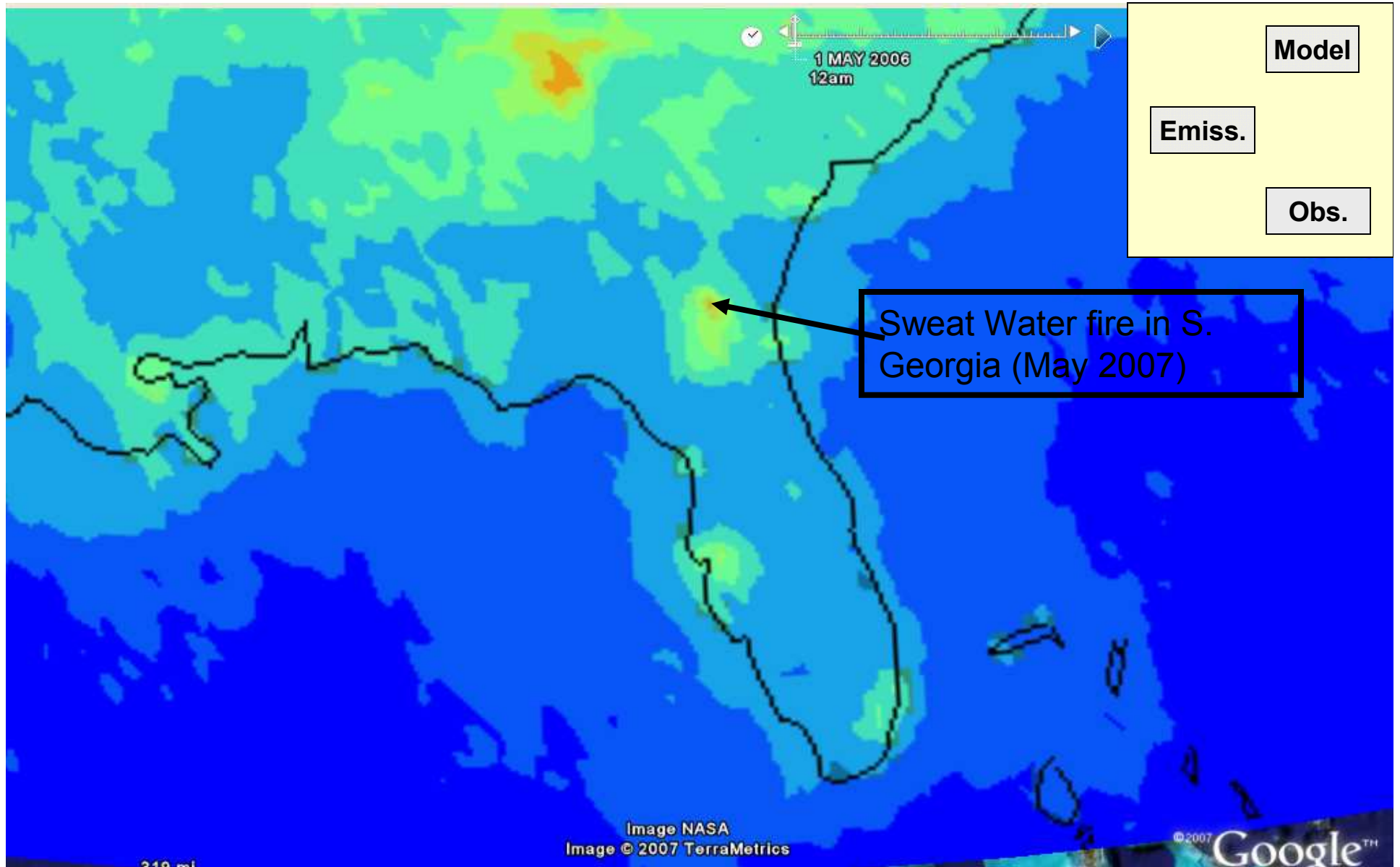
Single Point Sources



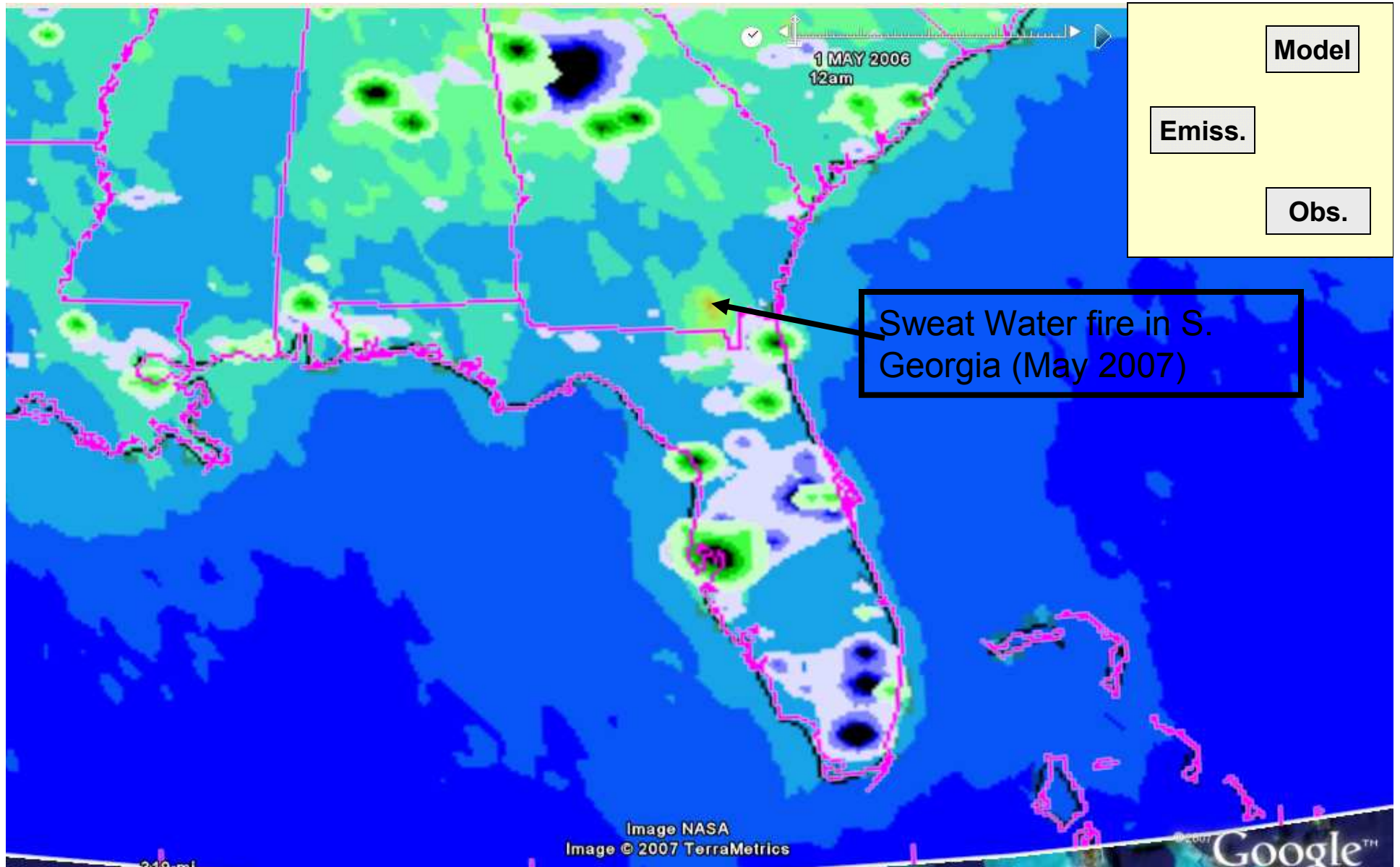
Single Point Sources



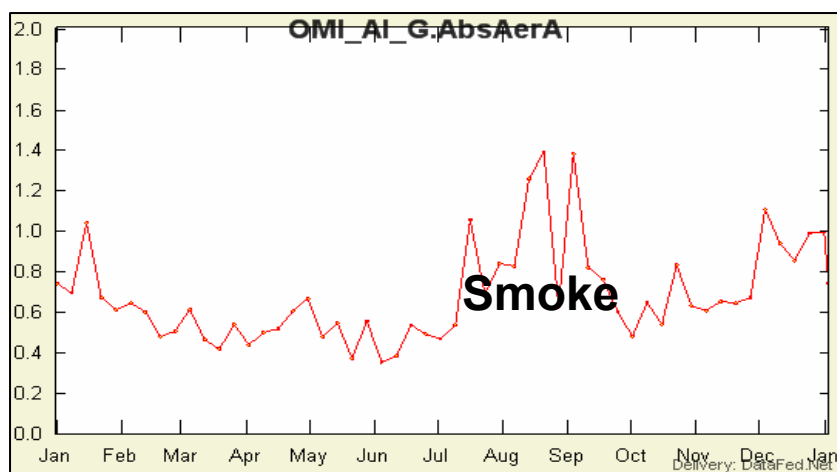
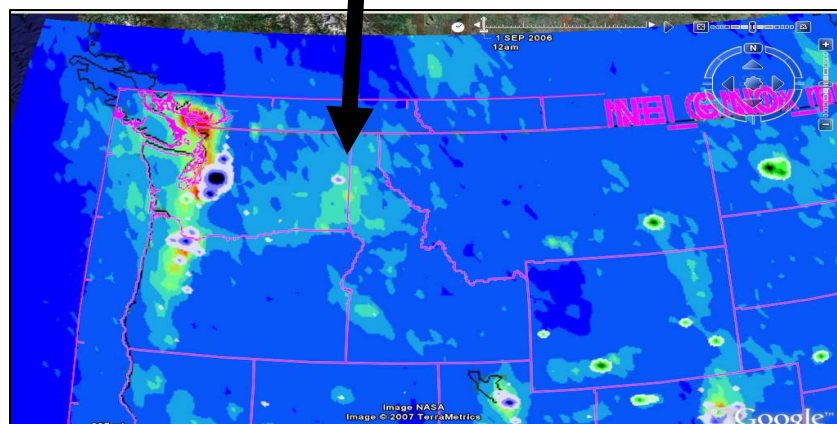
Georgia Sweetwater Fire



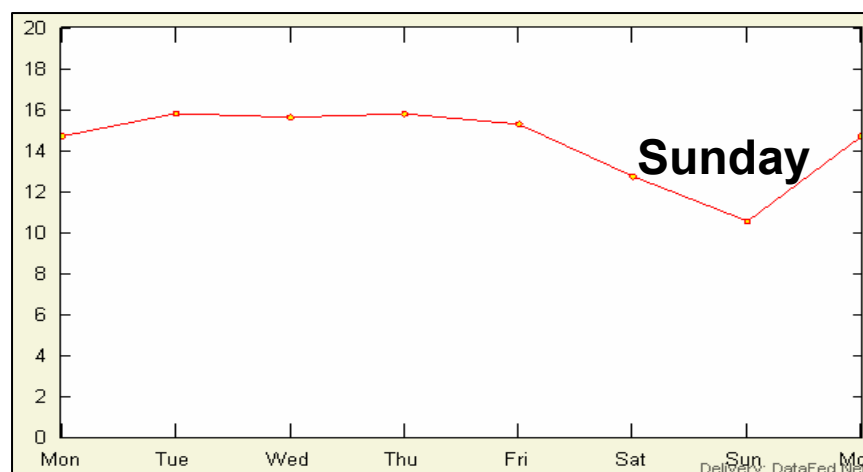
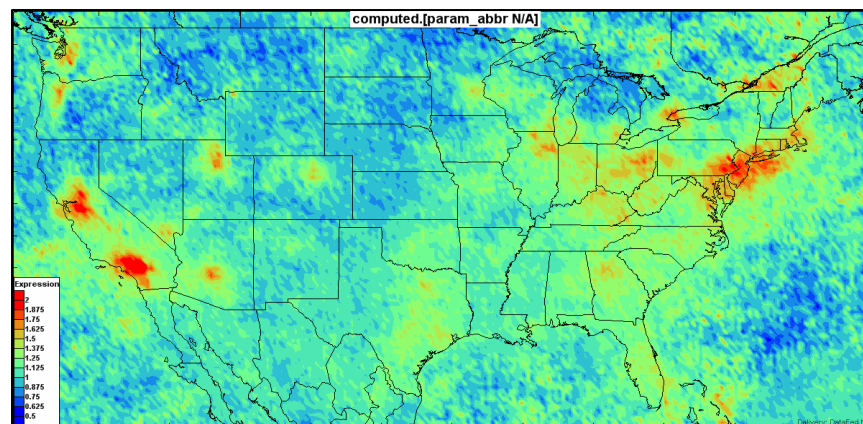
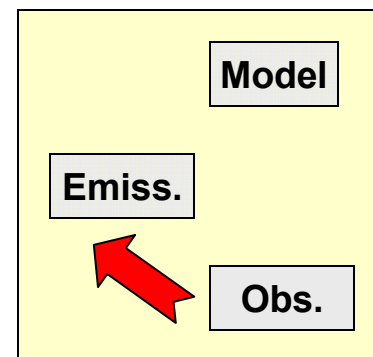
Georgia Sweetwater Fire



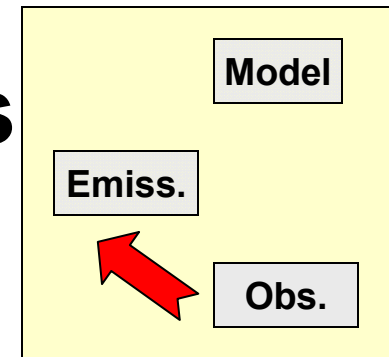
Biomass Burning



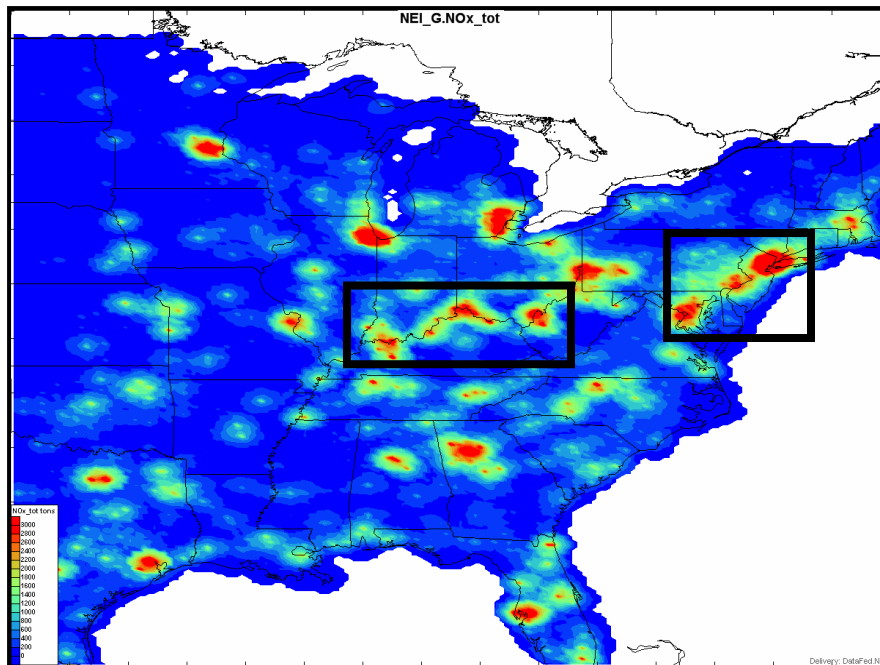
Friday/Sunday Ratio



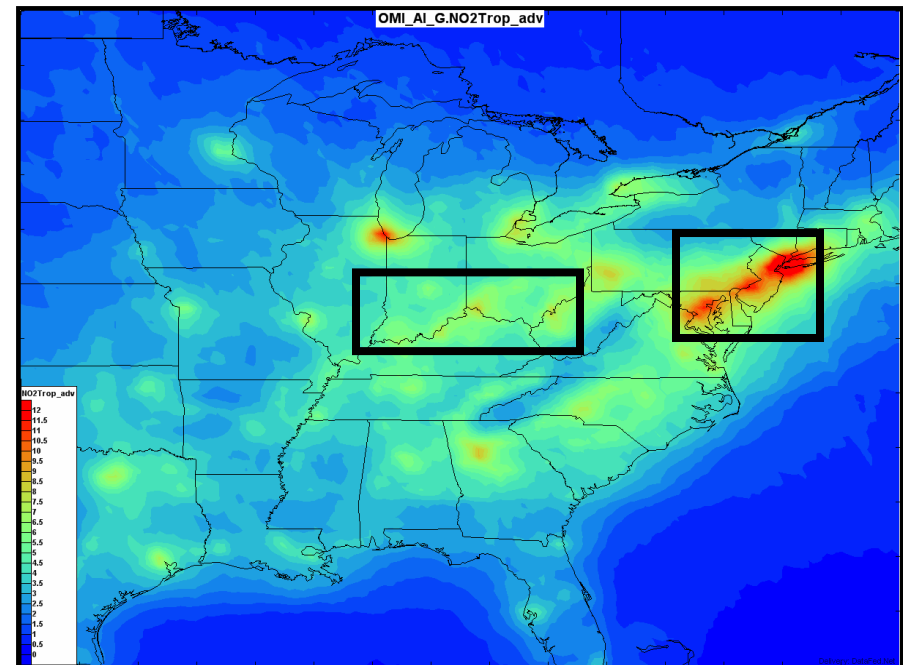
OMI/NEI Emission Ratios



US NEI NO_x Emission

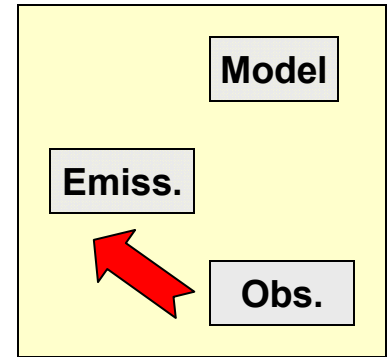


OMI Tropo NO₂



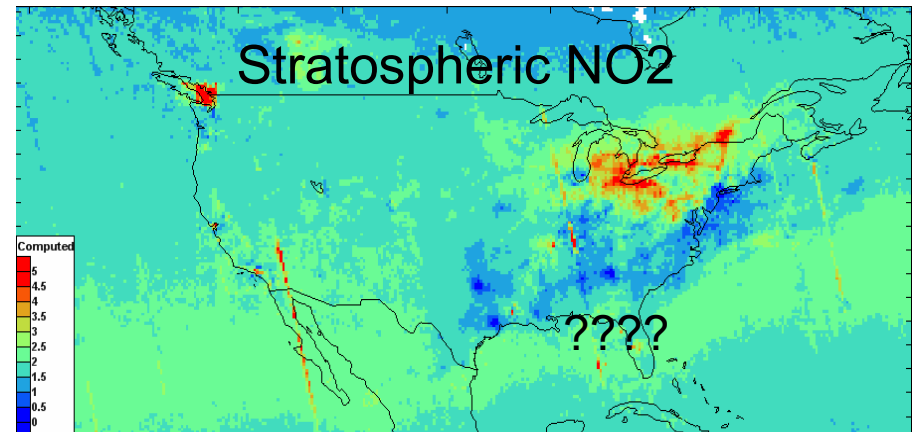
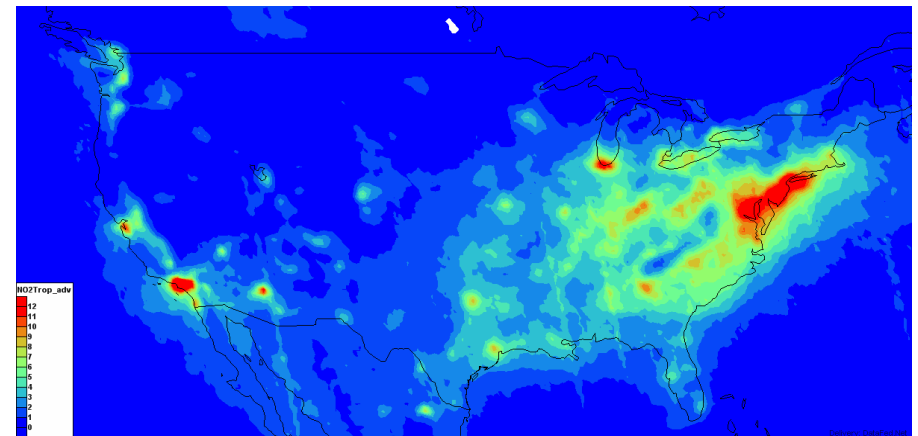
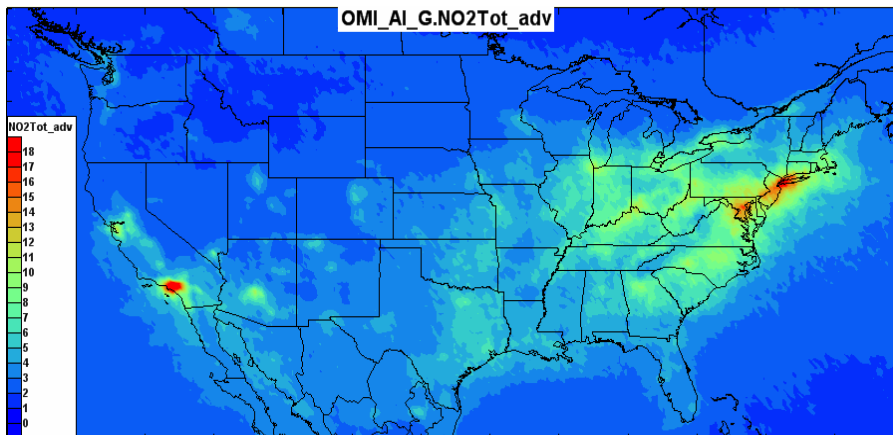
- Ohio River OMI/Emiss = 1
- **Northeast OMI/Emiss = 1.4**

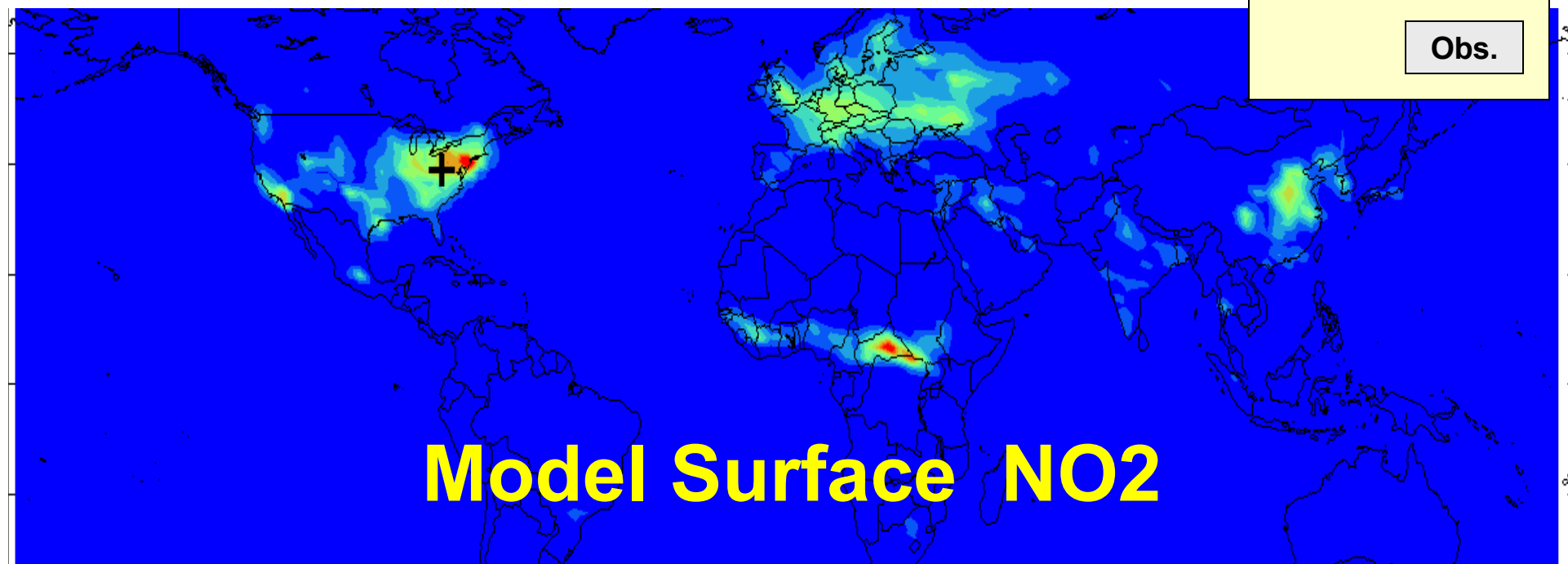
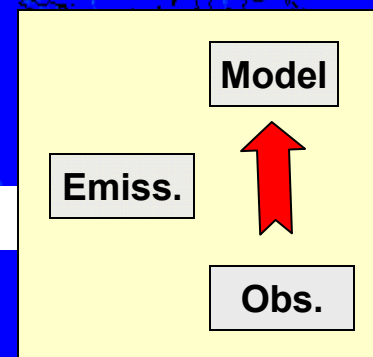
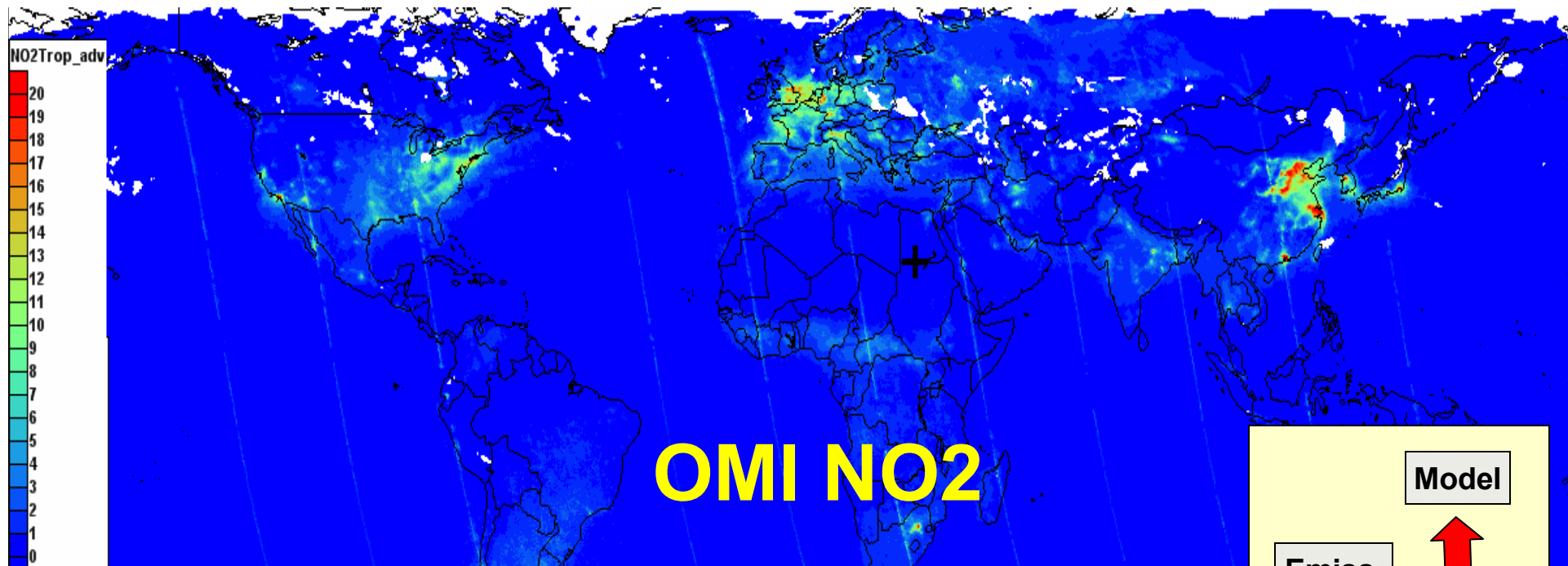
Total, Tropospheric, Upper



Tropo NO2

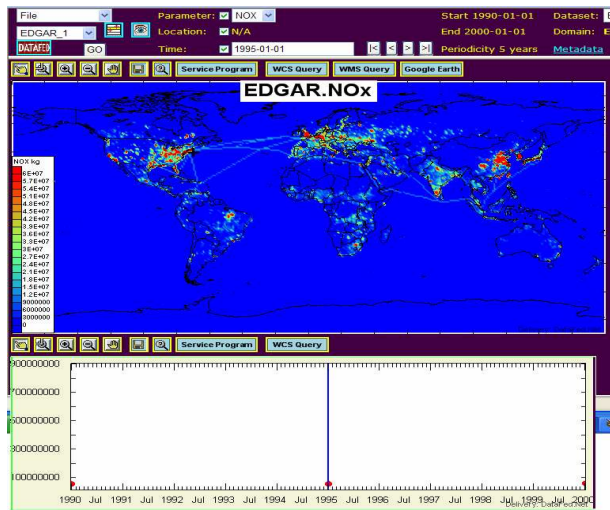
Total Column NO2



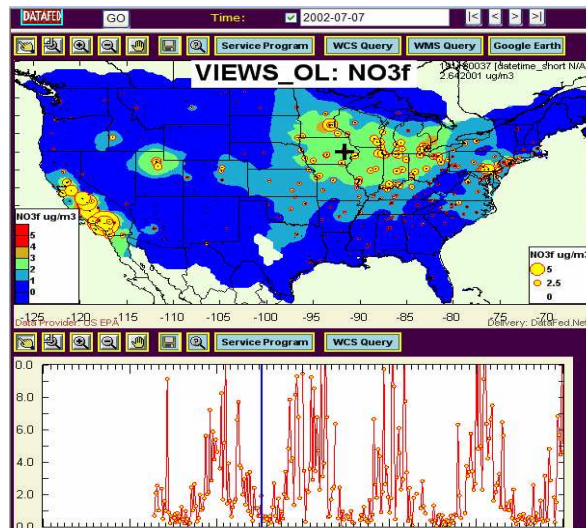


NOx Data on the Network

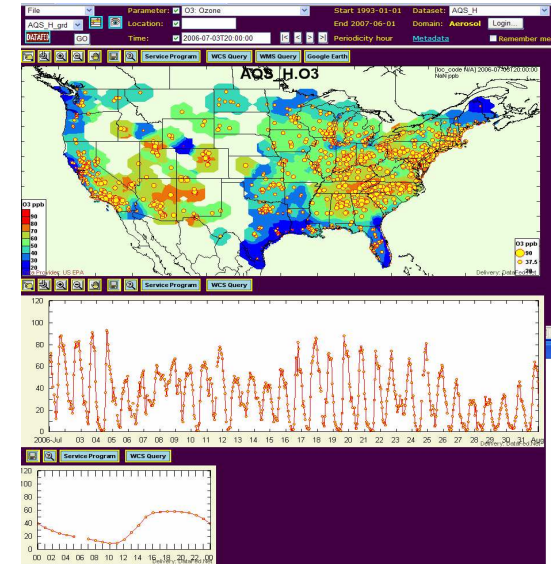
Emission



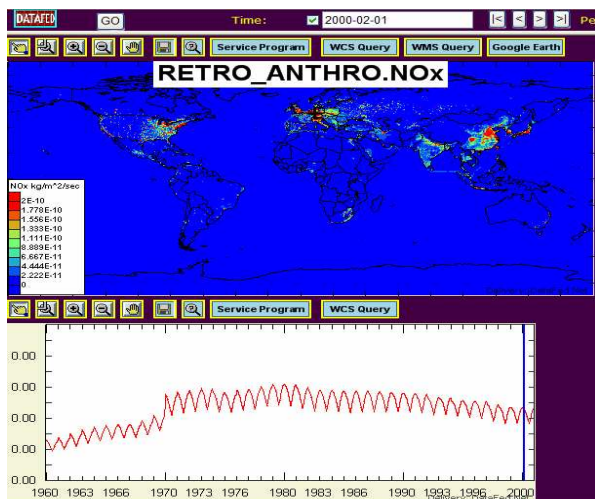
Aerosol Nitrate



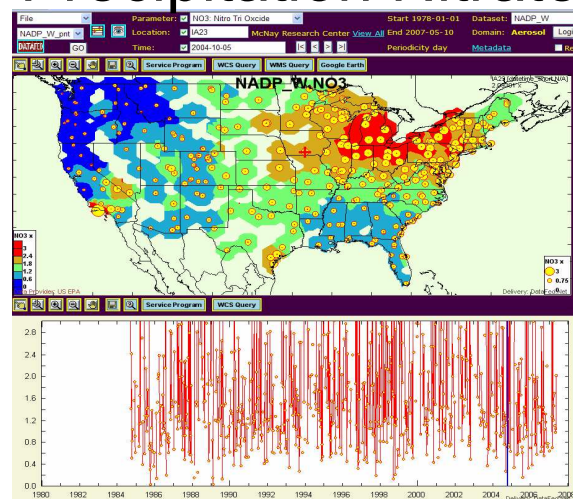
Ozone

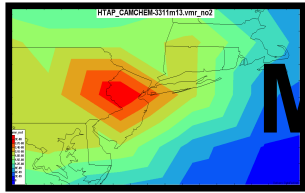


Emission



Precipitation Nitrate

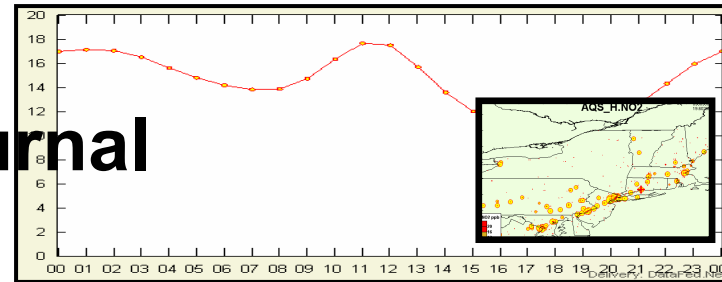




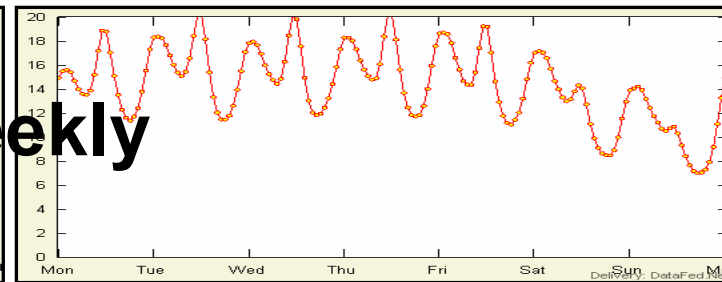
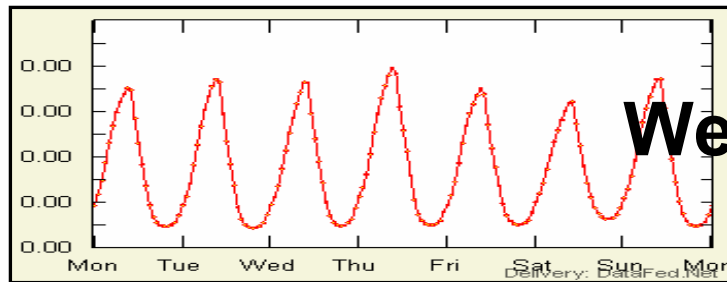
Model

Surface Obs.

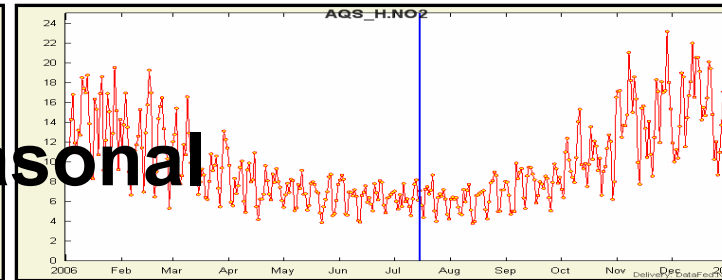
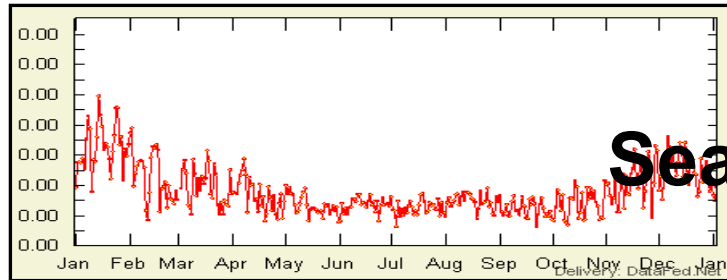
Diurnal



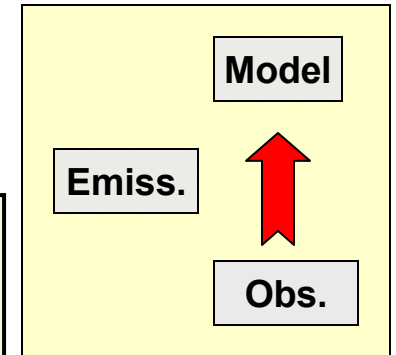
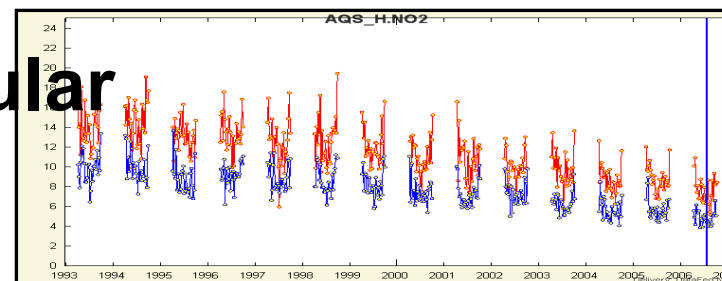
Weekly



Seasonal



Secular




Exceptional Event Analysis


Goal:

Understand, quantify AQ impact of Events

Approach:

- Community, collaboration
- ‘Harvesting’, aggregating resources in a wiki workspace
- Communal and individual analyses

[<Backlink to Event Analysis Workspace](#)
071022 Southern California Smoke



Description: Drought and Santa Ana winds created "perfect fire" conditions in S. California

- There is a wealth of information on the event dispersed over the Web
- This wiki is for capturing info resources on the smoke and its air quality impacts
- Users are encouraged to contribute and to **use the resources to analyze and learn**

Type: Smoke | Location: Southern California | Dates: October 22, 2007 - {{{EndDate}}}| Lat: 30, 38 | Lon: -130, -110

Interested in the California Smoke Event? Please join us in harvesting web resource

Please use the tag **071022SoCalSmoke** in [Del.icio.us](#), Flickr, Blogs, YouTube to identify Web resource

Ideas, comments, questions? Contact rhusar@me.wustl.edu or stefan@wustl.edu

Aerosol and Smoke Forecasts

Smoke forecast are now being performed by diverse approaches, including chemical transport models that assimilate fire observations and forward trajectory models. In the resource table below the smoke forecast are available as quantitative datasets that can be browsed and analyzed. The additional links below point to forecasting presented through their respective, dedicated interfaces.

	DatasetTitle	ProviderAbbr	DataType	SampleMethod
AIRNOW	Surface Monitoring Data for PM2.5 and Ozone	EPA	POINT	Point
EMC Model	EMC_Model	NOAA	SeqImage	Model
GOCART G-OL	Global Chemical Transport Model	NASA	GRID	Model
NAAPS GLOBAL	NRL Global Aerosol Model	NRL	Image	Model
NAAPS NoAm	NRL Global Aerosol Model	NRL	Image	Model

Web pages to smoke forecasts, tagged as 071022SoCalSmoke Forecast:

USFS BlueSky/CMAQ California Predictions 26 October 2007, by raffscallion

IDEA - Infusing satellite Data into Environmental Applications 26 October 2007, by rhusar

EMC: Air Quality Forecast Home page 26 October 2007, by rhusar

Mesoscale Modeling Branch 25 October 2007, by enimr

NOAA Smoke Forecast Loops 25 October 2007, by srl_dsc

Smoke Forecasting Demo Project - Forecasting Page 24 October 2007, by rhusar

AIRNow - Home 24 October 2007, by rhusar

The AIRNow Website (EPA, NOAA, NPS, tribal, state, and local agencies) provides easy access to US air quality: daily AQI forecasts; real-time AQI conditions; links to air quality Web sites. 24 October 2007, by rhusar

NRL Monterey Aerosol Shortcuts Page 24 October 2007, by rhusar

Links to the NAAPS global aerosol model for dust, smoke, and sulfate, meteorological and satellite data. 24 October 2007, by rhusar

NOAA's NWS/EPA - U.S. Air Quality Forecast Guidance 21 June 2007, by rhusar

Aerosol and Smoke, NearRealTime

	DatasetTitle	ProviderAbbr	DataType	SampleMethod
AIRNOW	Surface Monitoring Data for PM2.5 and Ozone	EPA	POINT	Point
CALIPSO	CALIPSO Lidar Browse Images	NASA	Image	RemoteSens
GASP	Dataset Title	NOAA	SeqImage	Model
GASP.tif	Dataset Title	NOAA	SeqImage	Model
GOCART G-OL	Global Chemical Transport Model	NASA	GRID	Model
HMS Fire	Dataset Title	NOAA	POINT	RemoteSens
MOPIIT Day	Dataset Title	NCAR	Image	RemoteSens
NOAA HMS WFS	Dataset Title	NOAA	POINT	RemoteSens
OMI AI G	OMI Absorbing Aerosol Index	NASA	GRID	RemoteSens
OnEarth JPL	OnEarth Daily Aqua Terra Global Composite Images	NASA	SeqImage	RemoteSens
SURF MET	Global Surface Meteorology Monitoring Network	PSWC	POINT	Point
SURF MET WIND	Global Surface Meteorology Monitoring Network	PSWC	POINT	Point
TOMS AI G	TOMS Absorbing Aerosol Index	NASA	GRID	RemoteSens

Interagency real time smoke monitoring 29 October 2007, by srl_dsc

Fire Hazard Mapping System - Satellite Services Division 24 October 2007, by rhusar

AIRNow - Home 24 October 2007, by rhusar

The AIRNow Website (EPA, NOAA, NPS, tribal, state, and local agencies) provides easy access to US air quality: daily AQI forecasts; real-time AQI conditions; links to air quality Web sites.

NOAA Satellite Fire Detections 24 October 2007, by rhusar

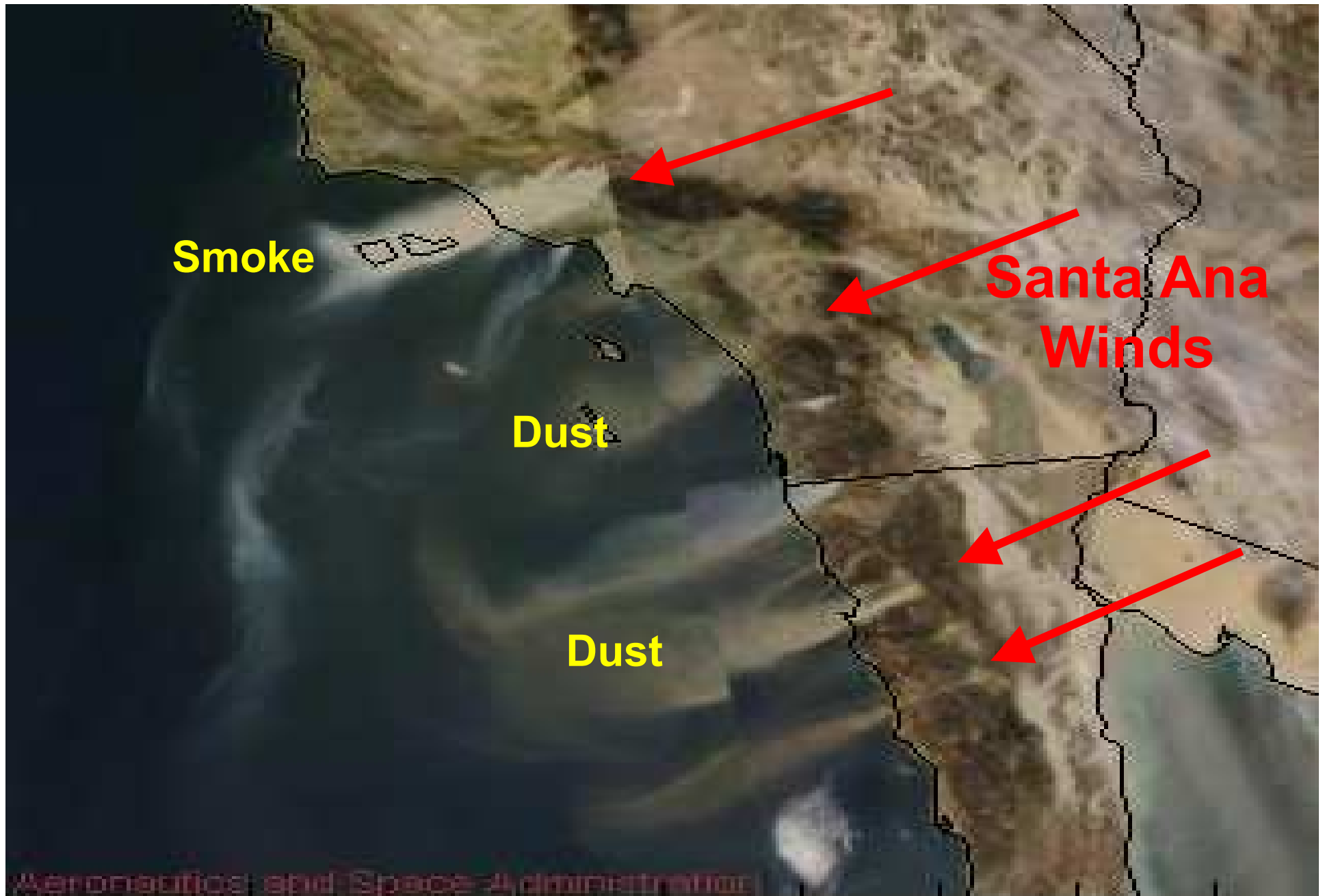
Science Web Links

USFS BlueSky/CMAQ California Predictions 26 October 2007, by raffscallion

EUMETSAT - Infrared Closures 25 October 2007, by rhusar

EUMETSAT - Media - Metop-A sees California fires 25 October 2007, by rhusar

October 2007 Southern California Fires



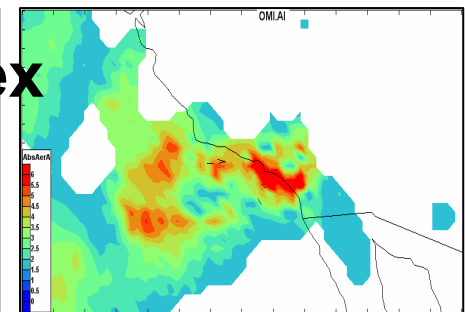
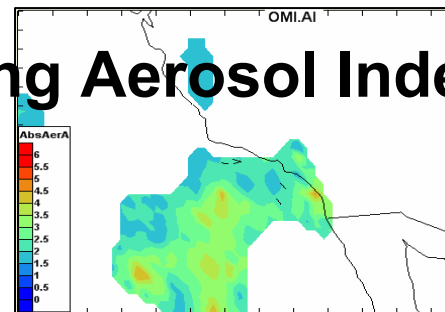
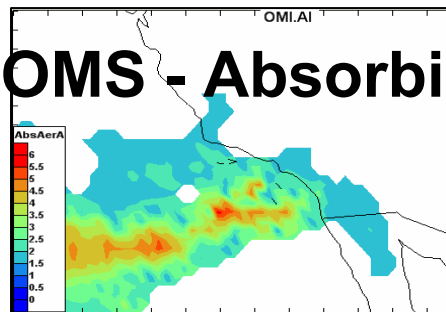
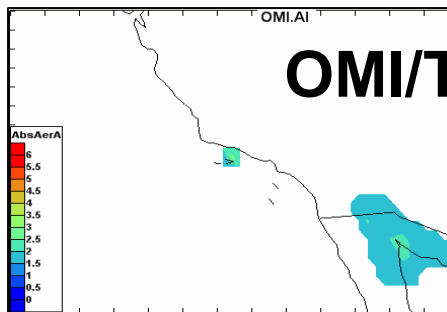
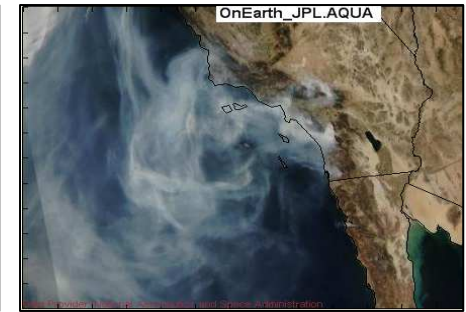
Southern California Fires

Oct 21, 2007

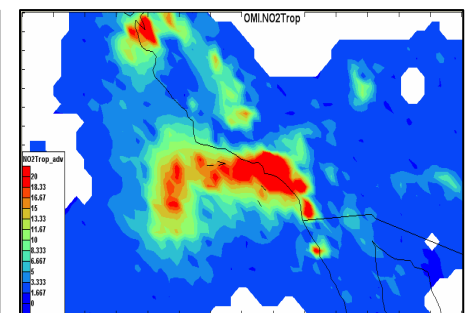
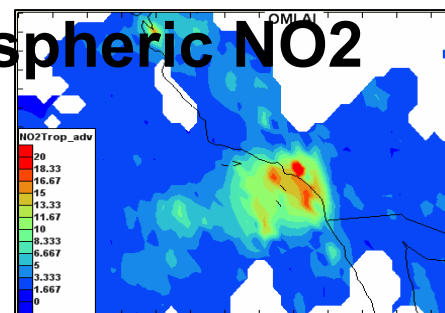
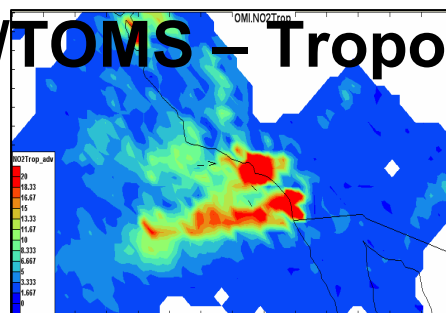
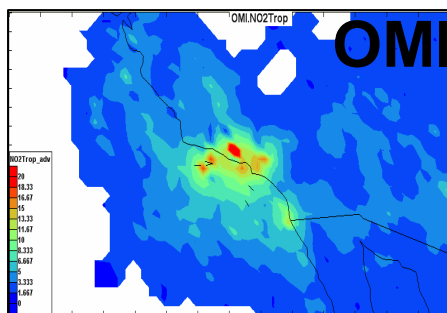
Oct 22, 2007

Oct 23, 2007

Oct 24, 2007

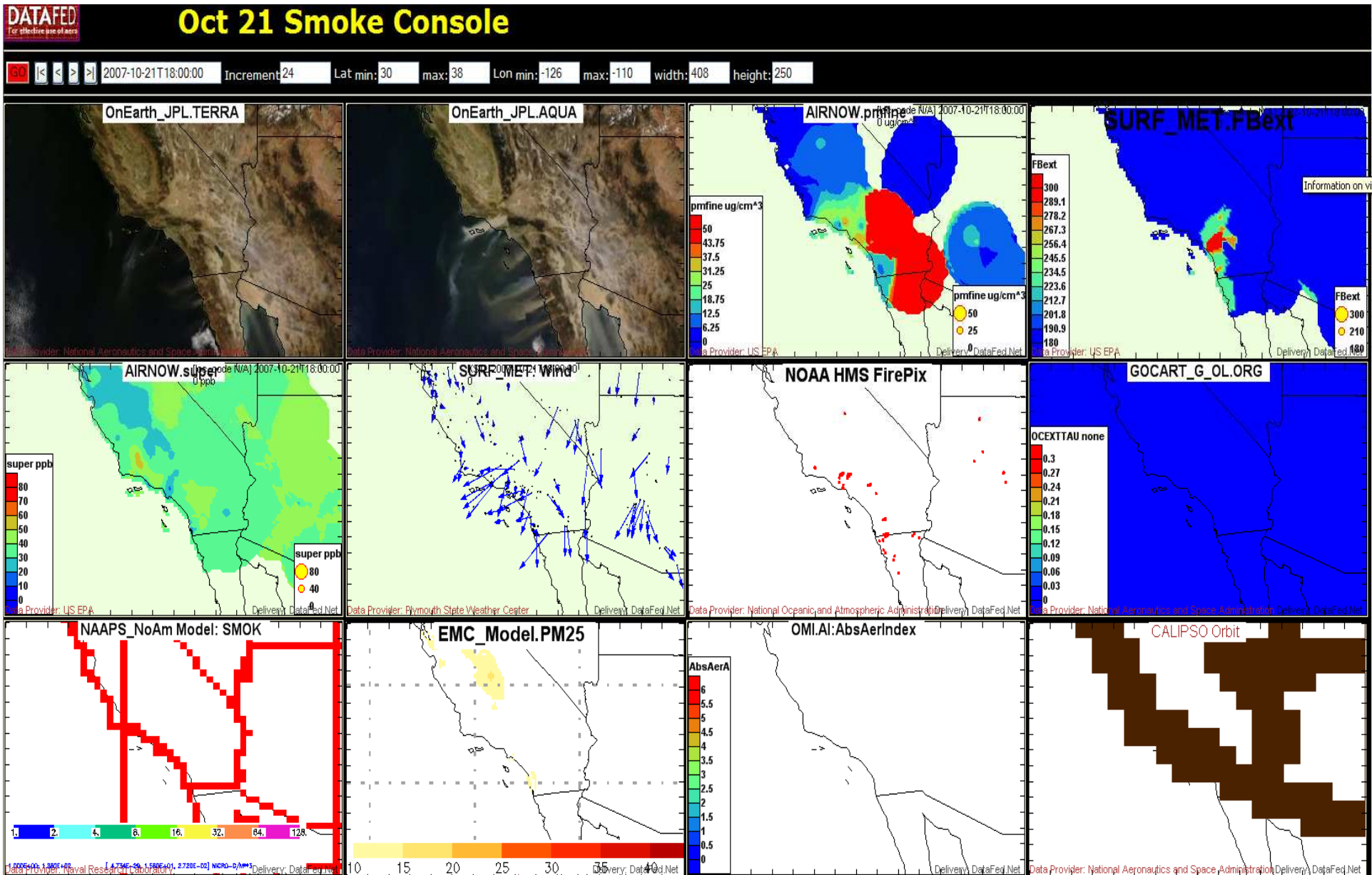


OMI/TOMS - Absorbing Aerosol Index



OMI/TOMS - Tropospheric NO2

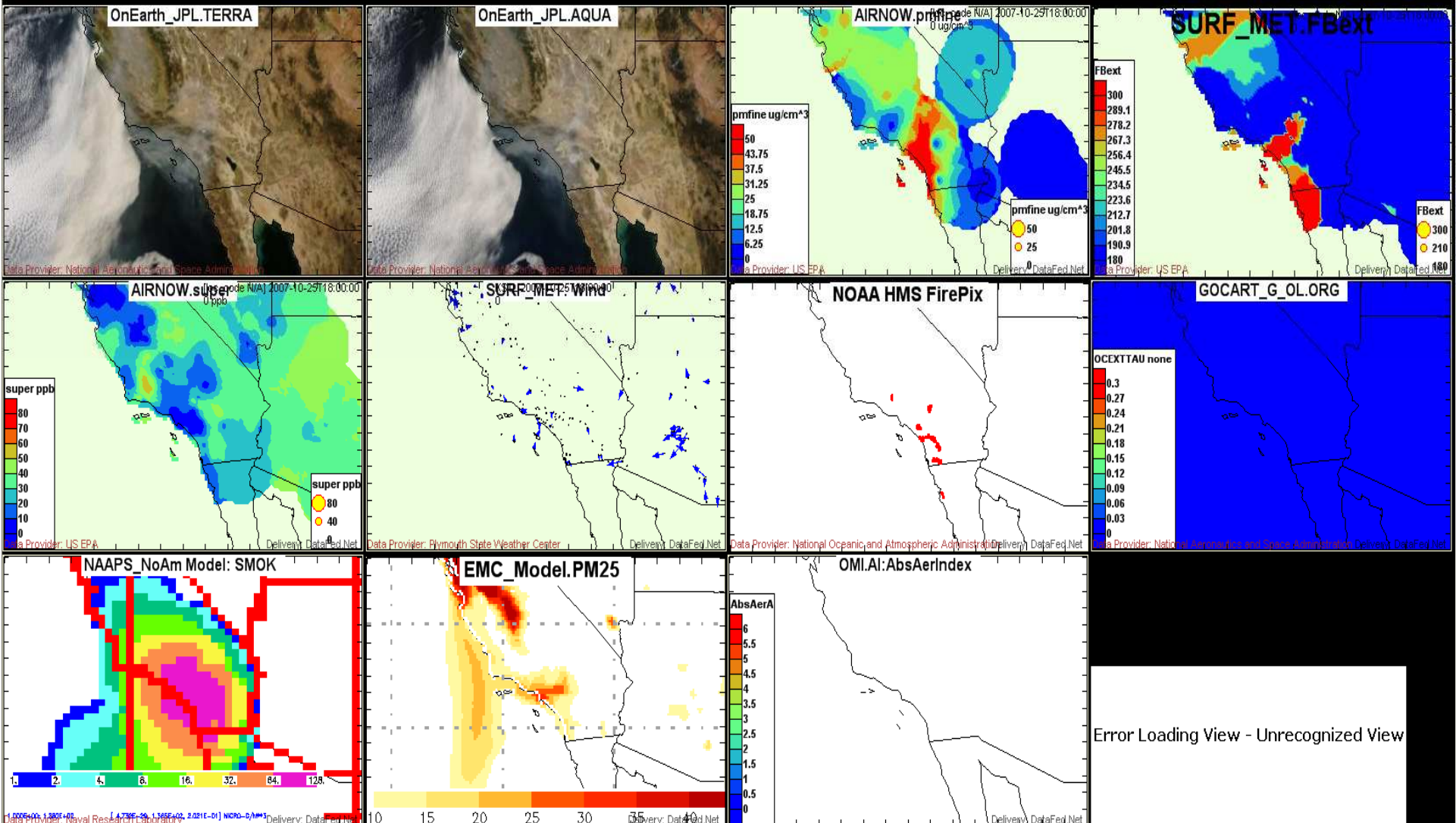
- The hi-res OMI data provides columnar NO2 and Aerosol Index
- The difference of their spatial pattern indicates smoke age(??)



- Consoles are multi-view panels of space-time synchronized data views
- On Oct 21, note the burst of smoke, dust between 11 AM and 1:30PM

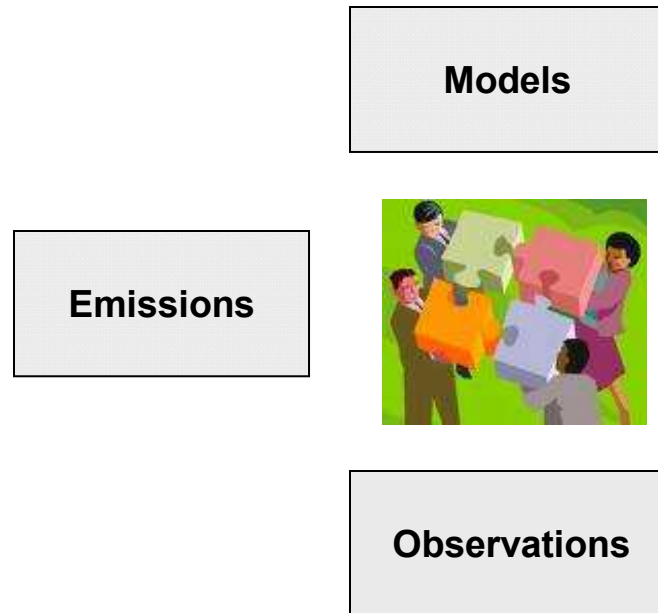
Oct 25 Smoke Console

60 < > 2007-10-25T18:00:00 Increment: 24 Lat min: 30 max: 38 Lon min: -126 max: -110 width: 408 height: 250



- By Oct 25, the smoke has drifted inland, toward N-NE
- The NAAPS model forecasted the smoke, the other models did not

Looking forward networking with you



Thank You